RESEARCH ARTICLE

Grain Quality of Irrigated Bread Wheat Produced by Farmers in the Southern Warm and Dry Agro-climatic Zone of Iran in 2018-2021 Cropping Seasons

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ABSTRACT

Naghipour, F., Esmaeilzadeh Moghaddam, M., Sanjani, S., Najafian, G., Najafi Mirak, and T., Jasemi, S. Sh. 2022. Grain quality of irrigated bread wheat produced by farmers in the southern warm and dry agro-climatic zone of iran in 2018-2021 cropping seasons. **Seed and Plant Journal 38:** 1- 31 (in Persian).

The quality of bread wheat grain not only affects the efficiency and production of flour, but it also contributes to the production of a product with more favorable technological and sensory characteristics and longer shelf life which by reducing waste and increasing productivity ensures the improvement of production chain efficiency from farm to table. Therefore, the current research was carried out to evaluate grain quality of irrigated bread wheat produced by farmers in the southern warm and dry agro-climatic zone provinces in 2018-2021. For this purpose, 642 irrigated bread wheat grain samples were collected from 10 provinces in the southern warm and dry agro-climatic zone of Iran, and the physical properties of the grain and the physico-chemical characteristics of flour for each cultivar in each province were evaluated. The results showed that Fars province with 43.1±2.4 g and Kohgiluyeh & Boyer-Ahmad province with 36.1±3.5 g had the highest and lowest 1000 grain weight, respectively. Cv. Chamran 2 had the highest (45.5±2.1 g) 1000 grain weight in Fars and the lowest (35.5±3.8 g) in Kohgiluyeh & Boyer-Ahmad. Also, the wheat grain samples produced in this agro-climatic zone were identified as “very heavy grain” considering average hectoliter weight (80.2±0.8 kg/hL). On the other hand, the highest protein content was observed in Khuzestan (12.4%) and Bushehr (12.1±0.3%) provinces, respectively. Fars province had the highest (27.0±1.4%) wet gluten content. By evaluating the grain hardness, it was revealed that cv. Mehregan had the highest (52.8±4.4) grain hardness index in Bushehr province and the lowest (49.0±1.4) in Lorestan. The highest and lowest grain hardness index, gluten index, zeleny sedimentation volume and SDS sedimentation height were observed in grain samples from Khuzestan and Kohgiluyeh & Boyer-Ahmad provinces, respectively. Finally, considering the observed variation in quality properties of grain samples of irrigated bread wheat cultivars in Iran which is affected by the differences in agro-climatic and field management practices, it is suggested that wheat grains produced, with high quality, in the southern warm and dry agro-climatic zone be used to improve the quality of end-use products of grains with lower quality produced in some other provinces in Iran.

Keywords: Irrigated bread wheat, 1000-grain weight, grain protein content, grain hardness index, wheat quality map.

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RESEARCH ARTICLE

Morphological, Phenological and Pomological Characteristics of Some Promising Pecan *(Carya illinoinensis)* Genotypes in Dezful in Iran

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ABSTRACT

Ajamgard, F., Ghazaian, M., Shooshi Dezfuli, A. A., and Yavari Nejad, R. 2022. Morphological, phenological and pomological characteristics of some promising pecan (*Carya illinoinensis*) genotypes in Dezful in Iran. **Seed and Plant Journal 38:** 33- 52 (in Persian).

To select the high yielding and adapted pecan genotypes for Dezful climatic conditions in Iran, 50 seedling trees were evaluated in 2019-2021 in Dezful in southwest of Iran. The results showed that P200-7 and P200-8 genotypes had the largest and smallest nuts with 14.3 and 4.2 grams, respectively. P220-2-1 genotype had the highest and P200-9, and P220-2-5 genotypes had the lowest percentage of blank nuts. Kernel removal was easy in P200-1 and P200-10 genotypes, while it was very difficult in P200-3 and P200-31 genotypes. Fruit ripening time was the earliest in P200-1 and P220-2-5 genotypes and the latest in P200-23. P200-23, P220-1-1 and P200-9 genotypes had the highest yield index with 65, 49 and 39 g cm^{-2} of tree trunk, respectively. The results of evaluation for heat stress tolerance in pecan genotypes showed that 40 to 70% of the branches of all genotypes were damaged by hot temperatures in the summer of 2021 with 430 hours of temperatures above 45 ^oC, while the branches of P200- 23 genotype were not damaged. In addition, the results indicated that heat stress damage had significant correlation with yield index (r = 0.311*) and kernel color (r = 0.323*). There was highly significant (r = -0.597**) correlation between shell thickness and kernel removal. The relationship between mean fruit weight and nut length (r = 0.386**) and nut width (r = 0.440**) were also highly significant. Factor analysis showed that nut length, shell thickness, blank nuts percentage, nut weight, yield index and heat stress damage accounted for 67% of the total variance. Finally, P200-23 genotype with high yield index, golden bright kernel color and very high heat stress tolerance, and P220-1-1 genotype with high yield and low percentage of blank nuts were identified as promising genotypes for future supplemental research.

Keywords*:* Pecan, heat stress damage, blank nut, fruit weight, fruit yield.

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RESEARCH ARTICLE

Genotype × Environment Interaction Effect on White Sugar Yield of Winter-Sown Short-Season Sugar Beet (*Beta vulgaris* L.) Cultivars

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ABSTRACT

Taleghani, D., Saremirad, A., Hosseinpour, M., Ahmadi, M., Hamidi, H., and Nemati, R. 2022. Genotype × environment interaction effect on white sugar yield of winter-sown short-season sugar beet cultivars. **Seed and Plant Journal 38:** 53- 69 (in Persian).

The promotion and development of winter-sown sugar beet is one of the significant approaches for using seasonal rainfalls and saving irrigation water for its production. For this purpose, the present study was conducted to study the of genotype × environment interaction effect on white sugar yield of 11 winter season short-season sugar beet cultivars, and selection of superior cultivars in three regions of Moghan,(2019, 2020 and 2021) Torbat-e-Jam (2020 and-2021), and Joveyn (2020) using randomized complete block design with four replications. Combined analysis of variance showed that the environment, genotype and genotype × environment interaction had significant ($P \leq 0.01$) effect on white sugar yield. The GGE biplot method revealed that the first and second main components explained 83.64% of the total variation in white sugar yield. Based on the GGE biplot method, in Moghan 2021, cv. SVZB2019 and Dravos, and in Moghan 2019 and 2020, in Torbat-e-Jam 2020 and 2021 and in Joveyn 2020, cv. FDIR19B3021, cv. FDIR19B4028 and cv. SVZA2019 identified as the best cultivars with high white sugar yield and yield stability, respectively. In general, it was concluded that the environment played a significant role in phenotypic expression of the white sugar yield in the winter-sown short season sugar beet cultivars. Therefore, it would be necessary to select and release sugar beet cultivars adapted to climatic and agronomic conditions for winter sowing in target environments.

Keywords: Sugar beet, yield stability, phenotypic expression, GGE biplot, ideal environment

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RESEARCH ARTICLE

Association of Resistance Level to the Fire Blight (*Erwinia amylovora*) Disease with Chloroplastic and Mitochondrial Oxidative Stress in Two Pear Cultivars Harrow Sweet and Barteltt

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ABSTRACT

Seyedi, M., and Abdollahi, H. 2022. Association of resistance level to the fire blight (*Erwinia amylovora*) disease with chloroplastic and mitochondrial oxidative stress in two pear cultivars Harrow Sweet and Bartlett. **Seed and Plant Journal 38:** 71-90 (in Persian).

Oxidative stress of the fire blight disease in host plant consists of chloroplastic and mitochondrial oxidative stresses that leads to the necrosis of tissues. This research was conducted to quantify and compare the role of oxidative stress of these organelles using glutaraldehyde as chloroplastic inhibitor of electron transport chain (ETC) and rotenone as mitochondrial inhibitor ETC. Due to the necrotic effect of inhibitors, in the primarily tests, different concentrations of inhibitors were examined under *in vitro* conditions and two concentrations of inhibitors (5 and 10 mg l^{-1}) were optimized for co-cultivation tests of host-pathogen interaction. In co-cultivation tests, necrosis appearance was recorded at 48 and 72 hours after inoculation in susceptible cv. Bartlett and tolerant cv. Harrow Sweet, respectively. Although both concentrations of inhibitors postponed necrosis appearance and reduced necrosis progress rate, but in cv. Harrow Sweet, higher effects of glutaraldehyde were observed in 10 mg l^{-1}. The higher effects of chloroplastic glutaraldehyde inhibitor demonstrated more effective role of the chloroplastic ETC in oxidative stress of pathogen in comparison with the role of mitochondrial ETC. Additionally, in susceptible cv. Bartlett, mitochondrial inhibitor caused similar necrosis progress rate to the chloroplastic inhibitor which demonstrated another evidence for more effective role of chloroplast organelle in resistance to the fire blight disease in cv. Harrow Sweet.

Key Words: Pear, resistance, necrosis, organelle, glutaraldehyde, rotenone, electron transport chain.

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RESEARCH ARTICLE

Effect of Early and Late Season Drought Stress on Agronomic Characteristics, Seed and Oil Yield of Safflower (*Carthamus tinctorius* L.) Genotypes in Marginal and Saline Soils around Lake Urmia

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ABSTRACT

Pasban Eslam, B. 2022. Effect of early and late season drought stress on agronomic characteristics, seed and oil yield of safflower (*Carthamus tinctorius* L.) genotypes in marginal and saline soils around Lake Urmia. **Seed and Plant Journal 38:** 91-108 (in Persian).

The aim of this study was to evaluate the effect of early and late season drought stress on autumn sown safflower genotypes in marginal and saline soils around Lake Urmia in East Azarbaijan in Iran. A filed experiment was carried out as split-plot arrangements in randomized complete block design with three replications at Khosroshah agricultural research field station, East Azarbaijan agriculture and natural resources research and education center, Tabriz, Iran, in 2019-20 and 2020-21 cropping seasons. Experimental factors included: drought stress levels (non-stress, drought stress in rosette stage and drought stress in seed filling stage) and safflower genotypes (cv. Padideh, cv. Golemehr, cv. Parnian, and Mexico14 and Mexico248 promising lines). The irrigation (water with EC = 4.2 ds m^{-1}) of non-stressed plots was applied at the 80 mm and stressed plots at 180 mm evaporation from the Class A evaporation pan. The results showed that the effect of drought stress in the rosette stage on seed and oil yield was not significant. However, drought stress in the seed filling stage significantly decreased the seed no. $head^{-1}$ by 17%, 1000-seed weight by 7%, and seed and oil yield by 48% and 51%, respectively. Therefore, application of irrigation in seed filling stage of safflower crop is necessary. The effect of drought stress on leaf relative water content and canopy temperature indices was significant, and these two indices were suitable for evaluation of drought sterss effect on safflower genotypes. It was concluded that cv. Padideh, cv. Golemehr, and Mexico248 promising line with 1983, 1979 and 2087 kg h^{-1} seed yield, respectively, under drought stress conditions in the seed filling stage, were adapted and suitable for being grown under late season drought stress in marginal and saline soils around Lake Urmia.

Keywords: Safflower, rosette stage, seed filing stage, canopy temperature, relative water content, seed oil content.

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RESEARCH ARTICLE

Evaluation of Morpho-Physiological Characteristics of Leaves and Fruits, and Oil Quality Properties of Some Olive Cultivars and Genotypes in Ilam Province in Iran

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ABSTRACT

Shadivand, F., Erfani-Moghaddam, J., Ghanbari, F. 2022. Evaluation of morpho-physiological characteristics of leaves and fruits, and oil quality properties of some olive cultivars and genotypes in Ilam province in Iran**. Seed and Plant Journal 38:** 109-127 (in Persian).

In this study, morpho-physiological characteristics and oil quality properties of some olive cultivars and genotypes were evaluated in private olive orchards in Murmouri and Darehshar counties in Ilam province, Iran, in 2019 and 2020. Olive cultivars and genotypes included cv. Zard, cv. Shiraz, cv. Shengeh, cv. Koroneiki, cv. Golole, cv. Manzanilla, genotypes 4 and 7 were collected from Murmouri, and genotypes 9, 10 and 11 from Darehshahr. There were significant differences between cultivars/genotypes for morpho-physiological characteristics of leaf and fruit. The highest fruit weight (4.24 g) belonged to cv. Zard and cv. Golole, and the highest fruit length (2.36 cm) observed in genotype 7. The highest diameter, fruit flesh thickness and flesh weight recorded in cv. Golole. Also, the highest oil content in fresh matter (23.71%) belonged to cv. Zard. The results of principle component analysis (PCA) revealed that the first six components explained 91.47% of the total variation in morpho-physiological characteristics and oil quality properties. In PCA, fruit length, fruit diameter, stone dimensions, fruit and stone weight, flesh weight, fruit coloring and ripening times were predominant in the first component, indicating that these characteristics can be useful for evaluation of olive germplasm. Overall results of this study showed that some olive cultivars such as cv. Zard and cv. Golole were better adapted to the environmental conditions of the target areas in Ilam province in Iran.

Keywords: Olive, fruit weight, oil compositions, fatty acids profile, adaptation.

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